

THE ANNALS
AND
MAGAZINE OF NATURAL HISTORY.

[SECOND SERIES.]

No. 90. JUNE 1855.

XXXV.—*Monograph on the British Species of Phalangiidæ or Harvest-men.* By R. H. MEADE, F.R.C.S.

[With two Plates.]

THE Harvest-men have never excited much interest among British naturalists, few even being aware of the existence among us of more than three or four species; and this neglect is the more surprising, as from the considerable size possessed by most of them, the facilities for determining their characters are much greater than among many other minute animals which have received far more attention.

A desire to supply this omission has induced me to make the present attempt to arrange and describe all the British species that I have been able to obtain; and in doing so I shall endeavour to give the synonyms of other authors, as far as I can determine them with certainty; comparing in every instance the specimen with their descriptions and figures, and citing no work which I have not been able to examine.

On the continent, this family of Arachnidans has excited much more interest than in England. In France, Latreille published a memoir on them in 1802, in the same volume with his 'Histoire Naturelle des Fourmis.' In this he briefly described ten species as natives of France, but his specific characters are short and imperfect, so that it is difficult to identify some of them; and he fell into the error of confounding together two or three of the most common species. Latreille's memoir was read at the Institute in 1796 (though not published until 1802), and he must be considered as the first author who endeavoured to revise the Linnæan genus *Phalangium*. In 1798 and 1799, Herbst published in Germany an elaborate monograph on this

Ann. & Mag. N. Hist. Ser. 2. Vol. xv. 26

tribe, which is contained in the second and third parts of the work entitled 'Natursystem der ungeflügelten Insekten,' by Lichtenstein and Herbst. Twenty-three species are here described, and most of them are also figured, but the descriptions and figures are not sufficiently accurate to be of much value. Herbst rejected the name of *Phalangium*, which he applied to the animals now placed in the genera *Phrynus* and *Telyphonus*, and adopted the title of *Opilio* in a generic sense, still keeping all the species of this family in one genus.

Soon after the appearance of the works of Latreille and Herbst, another was written on the same subject by Dr. J. F. Hermann; it is named 'Mémoire Aptérologique,' and was edited by Professor Hammer of Strasburg, where it was published in 1804 after the death of the author. It was accompanied by coloured plates which are very imperfect, but the descriptions of some of the species are tolerably good. Hermann retained the name of *Phalangium*. In his highly classical 'Genera Crustaceorum et Insectorum,' Latreille gave much more exact descriptions of some of the more common species of Harvest-men, but he perpetuated the error into which he had fallen, of confounding together the two distinct species *Phalangium cornutum*, and *Ph. opilio*, of Linnæus, describing them as being only the male and female of the same species. After the appearance of this work in 1806, nothing seems to have been added to our knowledge of the European Phalangiidæ until the publication of the works of Walckenaer in France and Koch in Germany. In the third volume of the 'Histoire Naturelle des Insectes Aptères' (which appeared in 1844) by the former author, the Phalangiidæ are described by M. Paul Gervais, who appears to have been satisfied with copying the descriptions of the French species from Latreille's first work; and I should think had never examined any of them himself, as he has fallen into all his errors. His synonyms are often very incorrect.

The works of Koch occupy a very different position to the one just mentioned. The great work, 'Die Arachniden,' by this author (which was commenced by Hahn), contains many beautiful figures of these animals, and full and accurate descriptions of most of the European species. Koch, after the example of Herbst, rejects the name of *Phalangium* for the Harvest-men. He calls the family Opilionidæ, and subdivides it into many new genera; naming the one which contains the greatest number of species, *Opilio*.

Having thus briefly mentioned the principal works which have appeared on this subject, I must say a few words on the external form and structure, as well as the habits and manners, of these singular animals, before I begin the description of the

genera and species: I shall not enter however at any length into the anatomy of the Phalangiidæ, but must refer any of my readers who are anxious to obtain more information on this head, to an elaborate paper by Mr. Alfred Tulk on the "Anatomy of *Phalangium Opilio*," published in 1843 in the 12th volume of the 'Annals and Magazine of Natural History.'

The Phalangiidæ, which belong to the Tracheary division of the Arachnidæ, bear a considerable external resemblance to true Spiders, but differ in having much longer and more slender legs; in the abdomen being sessile or attached to the whole breadth of the cephalothorax, and destitute of spinnerets at its extremity; in having only two eyes, which are elevated on a common peduncle; and in having the mandibles or falces furnished with didactyle forceps.

The dermo-skeleton consists as in the Spiders solely of tough integument, but differs in being divided into rings or segments, generally very distinct on the abdomen, and marked with transverse rows of small projecting cells, tubercles, or ocelli. The body is of an oval or rounded shape and somewhat depressed. The cephalothorax and abdomen appear at first sight to be composed of a single piece, there being little or no constriction between them; but when closely examined, a strongly marked groove or ridge will mostly be seen separating the first ring of the abdomen from the plate or buckler covering the upper surface of the cephalothorax. The species are mostly of a sombre colour, varying from black or gray to brown and yellow. The upper surface of the abdomen is mostly marked by a wide longitudinal dorsal band (*vitta*) of a darker colour than the rest of the back, differing in shape in different species, but generally wavy or dentated at the edges. This band often extends forwards to the cephalothorax; sometimes it is indistinctly seen, but some traces of it may almost always be distinguished. The cephalothorax, which constitutes about a third or fourth of the length of the body (being proportionally much larger in the males than the females), is trapezoid in form, being narrower in front, where it is generally excavated or concave, and having the sides prolonged backwards and outwards. The lateral edges are surrounded by a sinuous or wavy border, on which, opposite the attachment of the first pair of legs, are seated two stigmata or spiracula, which were clearly described by Latreille, but have since been sometimes mistaken for cornea or simple eyes. The eyes, two in number, are large and simple, and seated upon an eminence or elevation placed nearly in the centre of the cephalothorax; one eye being placed laterally upon each side of the eminence, which is mostly semicircular in shape, and surrounded by a double crown or crest, which is armed with tubercles or

spines. The upper surface of the cephalothorax is also often furnished with sharp teeth or tubercles; the size and arrangement of which, as well as the size and form of the eye-eminence, form good generic and specific characters.

The falces each consist of two joints. The basal joint projects forwards and arises from the cephalothorax within a cavity situated beneath the anterior border of the plate. The terminal joint is bent downwards, and terminates in a curved, horny, immoveable pincer, which is opposed and articulated to another pincer (by some reckoned as a third joint) similarly constructed, but freely moveable. Both pincers are furnished with teeth upon their inner edges. In the males of several species the falces are provided with horns, or processes of various forms and sizes.

The parts composing the mouth are very complicated; the oral aperture is surrounded by three pairs of lateral bodies which are called maxillæ, and is bounded below by a membranous lip. There are two long palpi consisting each of five divisions; the intermediate joints are sometimes furnished with processes or branches, and the last is armed with a claw. They are connected with the first pair of maxillary bodies. Savigny says *, "On examining the palpi of the Harvest-men and other Arachnidans, and comparing them with the legs properly so called, we soon have many proofs that they are themselves only anterior legs more or less altered. The connexion between them is so close, that in the *Phalangia* the four long anterior legs have their first joint converted into a supplementary maxilla: in fact the *Phalangium* has six maxillæ, of which two only support palpi and four others true legs." He adds further on, "It appears to me certain that the Arachnida possess neither true mandibles nor true maxillæ."

The variations of form in the maxillæ are of no value among the Phalangiidæ, in affording generic or specific characters, as with the true Spiders.

The legs, remarkably long and slender in most species, are eight in number, and consist of numerous joints; the first is named the coxa, and is immoveably fixed to the under part and side of the cephalothorax; the second is called the trochanter, it is very short and of a roundish or square form; this is connected with the former by a ball and socket joint, allowing of free motion in every direction. The third joint is generally very long, and frequently rugose and spiny; it is named the femur. The fourth and fifth are called the first and second joints of the tibia, which is said to be divided; the first of these is much

* Mémoire sur les Anim. sans Vertèbres, p. 57.

shorter than the second, and neither of them equals the femur in length. The remaining part of the leg is denominated the tarsus, and divided into numerous joints, the number of which varies in different species; the proximal joint is much longer than the succeeding ones, and is called by Koch* the heel; this is generally more or less distinctly subdivided into other joints, which seem however to be immoveable. Koch considers the variations in number of the subjoints of the heel and of the joints of the tarsus as forming valuable generic characters, but they appear to me to be too artificial, and will be found too difficult of application to be of much practical value.

The last subject to be mentioned in this sketch of the external anatomy of the Phalangiidæ is the situation of the generative organs. In this point the Harvest-men differ remarkably from the true Spiders, for in the latter the males may at once be distinguished from the females by the peculiar position of these organs at the extremity of the palpi, while in the Phalangiidæ they are placed in the same situation in both sexes, and present no external points of difference, so that it sometimes becomes very difficult (particularly in immature specimens) to distinguish the males from the females.

On the fore part of the under surface of the abdomen, immediately behind the parts composing the mouth, and extending as far forwards as the coxæ of the third pair of legs, an obtusely triangular body is placed, which is called the sternum by Mr. Tulk. This is the covering of the sheath of the sexual organs, the orifice leading to which is concealed beneath a thickened lip on its anterior border. If the sides of the front part of the abdomen are gently pressed by the finger and thumb in living adult specimens, the penis of the male, or the ovipositor of the female, may easily be made to protrude (an observation originally made by Lister), and thus the sexes may be distinguished. The male organ is a long slender curved body furnished at its extremity with a recurved hook, while the ovipositor is an elongated membranous tube surrounded by annuli or rings, which give it much the appearance of the trachea or windpipe of a small animal.

With regard to the habits of the Phalangiidæ very little is known. Their long legs enable them to run with great rapidity, particularly over grass and bushes; and Latreille says that they also act as feelers, for while resting upon a wall or tree, they are usually extended round the body in a circular manner at their full length, and if one of them is touched by any dangerous object, the Harvest-man immediately drops to the ground and

* Uebersicht des Arachnidensystems, 2 Heft, p. 22.

runs off. The legs show great nervous irritability, for when any of them are detached, they preserve an independent power of motion for some time. Geoffroy thought that these animals possessed the same power as the Spiders and Crustacea, of reproducing lost limbs; for he once met with an individual that had one leg much shorter than the others. No decisive experiments have been made on this subject, and Latreille thinks it very unlikely that they should have this faculty; for they are much shorter-lived than either Spiders or the higher Crustaceans, their term of existence being limited to the summer and autumn months. The female, whose abdomen in the autumn will be found filled with round white eggs, deposits these beneath stones, or in crevices of walls and in other secure places, and then dies; these eggs are hatched in the following spring or summer, when minute individuals, very similar in form and shape to the adult animals, may be found beneath stones or at the roots of grass. These increase in size during the summer, but do not arrive at maturity until the autumn, when the sexes pair; and as soon as cold weather sets in they all quickly disappear. No observations have been made as to whether the Harvest-men cast their integument and undergo periodical moultings, as in the true Spiders; and I have found it difficult to keep them alive in captivity so as to make experiments on this and other points in their œconomy. They are usually nocturnal in their habits, generally remaining concealed (or at rest on walls) during the day, and feed upon insects and other small animals. I captured however an adult female of *Phalangium urnigerum* in August 1854, while running across a path in a wood in the daytime with a fly (*Anthomyia*) in its falces as large as the common house-fly, which it was very unwilling to relinquish. Latreille says that they are very voracious and will destroy one another.

The Harvest-men are frequently infested by a bright red parasitic mite, which may very often be seen attached to their bodies or legs; it is named the *Trombidium phalangii**. This mite is only parasitic during its immature or larva state, when it is hexapod, of an oval shape, and has the head terminating in a projecting conical beak or sucker, by which it adheres to the skin of the *Phalangium*. Dugès has observed that they are ultimately detached from the Harvest-men, and secrete themselves in minute crevices in the earth, where they remain for the space of twenty days in the form of a smooth oval chrysalis like a small yellow egg, out of which there emerges the perfect mite, which has eight legs, is of an obtuse triangular shape,

* See Walek. Hist. Nat. des Ins. Apt. tom. iii. p. 180; and Latreille's Genera, tom. i. p. 161, where it is called *Leptus phalangii*.

very pubescent, and of a bright scarlet colour, but having the head and legs yellow and semitransparent.

In conclusion, I beg to offer my acknowledgements to all those friends who have kindly collected and forwarded specimens of Phalangidæ for my inspection. My thanks are especially due to Mr. Blackwall, Mr. Francis Walker, and Dr. Sichel of Paris. The last-named gentleman sent me numerous interesting French specimens belonging to the different orders of Arachnida, which have been very useful to me in the determination of British species.

I propose to arrange the species of Phalangidæ in six genera, adopting the following classification :—

Class ARACHNIDA.

Order Phalangidea.

Family PHALANGIIDÆ.

Genus 1. *Phalangium*, Linn.

Legs long and thin, the second pair being five or six times the length of the body. Body oblong-oval, convex. Cephalothorax studded with tubercles, which are often furnished with short spines. Eye-eminence moderate in size, and surmounted by a double crest formed by tubercles or teeth. Abdomen generally marked by an angular dorsal band. Palpi moderate in length except in the males of some species, the second and third joints often with projecting angles, but not branched.

1. *Phalangium cornutum*, Linn. Pl. X. fig. 1.

Fœm. testacea. Dorsum abdominis vitta fusca marginibus angulatis signatum. Dentes duo minuti et porrecti, subter marginem anticum thoracis positi. Cristæ oculariæ conspicuæ et spinosæ. Oculi sursum distantes.

Mas, palpis longissimis, et falcibus superne longe cornutis. Long. fœm. 4, maris $2\frac{1}{2}$ lin.

Phalangium cornutum, Linn. Syst. Nat. by Turton, vol. iii. p. 716 ♂; Herm. Mem. Apt. p. 102. pl. 8. f. 6; Walck. Ins. Apt. t. iii. p. 118; Hahn, Die Arach. B. ii. p. 69.

Phalangium Opilio ♀, *cornutum* ♂, Latr. Hist. Nat. des Fourm. p. 377; Latr. Genera, t. i. p. 138.

Opilio cornutus, Herbst, Ung. Ins. Heft ii. p. 13. pl. 1. f. 3.

Cerastoma cornutum, Koch, Die Arach. B. xvi. p. 8. tab. 543.

Female. Lurid or testaceous. Body oval. Cephalothorax small, considerably narrower than the abdomen, and furnished at the sides with an irregular margin, which is armed at the

edges with several sharp tubercles, and separated by a deepish groove from the rest of the cephalothorax. In this groove are seated three oblong dark spots placed opposite the bases of the three first pairs of legs. The front edge of the cephalothorax is rather short and slightly excavated; its lateral angles project forwards between the bases of the first pair of legs and the falces, and there is a slight central projection, immediately beneath which are seated two small prominent teeth. The ocular eminence is of moderate size; the crests are rather widely separated by a groove, and each furnished with six or seven sharp teeth (fig. 1 *a*). In front of the eyes the cephalothorax is elevated, the central part smooth, and marked by two longitudinal dark parallel lines; several sharp tubercles armed with short black spines are arranged on each side of this smooth space, and a few others are scattered on the sides of the cephalothorax. The colour of the cephalothorax is yellowish-white, and there are several large irregular brown marks on each side. The eye-eminence is ferruginous.

The cephalothorax is separated from the abdomen by a groove, between which and the eye-eminence is a transverse row of small tubercles. The first two or three abdominal rings are distinctly marked, and also crossed by transverse rows of minute but sharp tubercles.

A broad longitudinal dentated dark band extends from the margin of the ring immediately behind the eye-eminence to the apex of the abdomen. The edges of this band for a short distance are straight; they then curve alternately inwards and outwards, forming two triangular projections on each side, the posterior of which is smaller and often indistinct. The band is often edged externally with white, and in many specimens is altogether indistinct. The sides of the abdomen are irregularly marked with brown. The whole under surface of the body is white.

The *falces* are strong; the basal joint is mottled above with brown, and furnished with a patch of small spines; the terminal joint forms rather an acute angle at the point of curvature, and is also furnished on its front surface with dark bristles.

The *palpi* are rather short; the third joint is thickened at its distal extremity, where it has a projecting angle on the inner side; they are marked with brown stripes on their upper surface.

The *legs* are long and slender; the femora quadrangular, the angles being armed with short dark spines; the distal ends of the femora are marked with a few brown spots; both joints of the tibiæ are also spotted with brown; the extremities of the tarsi are black.

The *male* is smaller than the female, but has the cephalo-

thorax proportionably larger, forming about two-fifths of the length of the body; the abdomen is depressed; the colour both of the body and legs darker, and the dorsal mark less distinct; the thorax is more spiny, and has the anterior angles strongly toothed and projecting; the falces are very large (fig. 1 *b*), the first joint strong, tuberculated and spiny on the upper surface; the second joint bears a large ascending horn, the apex of which is more or less bent forwards. The palpi are very long, being about one-third shorter than the first pair of legs; the second joint, which is much the longest, is of a dark brown colour and spiny. The legs are very long, of a dark colour, and have the femora very spiny. In young males, the horns on the falces, and the palpi are much shorter than in the adult individuals.

This common species is generally distributed. I have entered at considerable length into the description of the female in consequence of so many errors having been fallen into respecting it; by most writers this sex has been either unknown or confounded with *P. parietinum* (*opilio*, Linn.): see further remarks at the end of the description of that species.

2. *Phalangium urnigerum*, Herm. Pl. X. fig. 2.

Fœm. lutea vel cretacea, vitta angulata dorsali, et lateribus fuscis; thorax annulis abnormibus et obscuris; palpi articulis 3^{tiis} et 4^{tis} brevibus et crassis.

Mas, vitta dorsali lata et fere nigra, thoracem et frequenter abdomen obducente; dorsum tuberculis minutis albidis granulatum; pedes longissimi nigro irrorati.

Long. fœm. 3 ad 4, maris 2 ad 3 lin.

Phalangium urnigerum ♂, Herm. Mem. Apt. p. 110. pl. 9. f. 2, 3.

Opilio lucorum ♀, Koch, Die Arach. B. iii. p. 30. pl. 84.

Opilio albescens ♀, Koch, Die Arach. B. xvi. p. 33. pl. 551.

Opilio grossipes ♂, Koch, Die Arach. B. xvi. p. 23. pl. 548.

The *female* bears a considerable resemblance in size, colour and design to that of *P. cornutum*, and no doubt has generally been confounded with it: it differs however from the preceding species in having the front of the cephalothorax wider and straighter, in the absence of teeth beneath the middle of the anterior border, in the eye-eminece being smaller and narrower (fig. 2 *a, b*), the crests on its summit divided by a shallower groove, and furnished with shorter and blunter teeth. The upper surface of the thorax is provided with several white bluntish tubercles or papillæ, which are irregularly scattered over it, the greater number however being collected in somewhat of a semicircle (the concavity of which is forwards) between the eye-eminece and the anterior border. The sides

and front of the thorax are variegated with several irregular brown ring-shaped marks. The dorsal band, which is of a brown or blackish and sometimes reddish colour, generally with a light streak down the centre and dark margins, extends from the lateral edges of the thorax, opposite the insertion of the second pair of legs, even to the last ring of the abdomen. The band is wide in front, and gradually contracts in breadth to a point opposite the attachment of the fourth pair of legs; behind this it bends alternately outwards and inwards, forming two or three triangular projections on each side, and terminates in an indistinct rounded point at the extremity of the abdomen. The under surface of the body is whitish.

The *falces* are strong (fig. 2 *d*), the second joint forming a less acute angle at its point of curvature than in *P. cornutum*.

The *palpi* are rather longer and stronger than in the preceding species; the second joint with a slightly projecting angle at its inner extremity covered with a tuft of hair; the third and fourth joints short and thick, and as well as the second, variegated with black or brown marks.

The *legs* are long and striped with brown or black; the distal extremities of femora and tibiæ armed with short spines.

The *male* (fig. 2 *c*) resembles the female in structure, but is smaller and shorter, and is generally so much darker in colour, that it has been mistaken by all authors for a distinct species.

The *falces* and *palpi* are of the same form as in the female, but the legs are much longer.

The *palpi* and *legs* in adult individuals are often almost black; the upper surface of the cephalothorax and abdomen is also frequently of the same colour, including the eye-eminence, and it then has a pretty appearance from being studded with little pearl-like white papillæ or tubercles, arranged in transverse rows across the abdomen, and scattered irregularly over the thorax. The under surface and sides of the body are pure white.

This species is generally distributed over England, frequenting woody and grassy places, where the females may be found in various stages of growth during the whole summer, secreted beneath stones. The males are not met with until the beginning of autumn. The female of this species was first described by Koch under the name of *O. lucorum*; his *O. albescens* is also only a variety of the same species.

The male is separately described and figured by him under the name of *O. grossipes*, the title of a species described by Herbst; the figure and description given however by the latter author are too vague for identification, therefore I have adopted the name of *urnigerum*, under which the male was clearly de-

scribed in the posthumous work of Hermann, by the editor Professor Hammer.

3. *Phalangium parietinum*, DeGeer. Pl. X. fig. 3.

Fæm. cinerea, subtus albida; dorsum fasciis transversis semilunariibus nigris, et punctis pallidis variegatum; eminentia oculorum parva; pedes fusco- et albo-annulati.

Long. 4 lin.

Mas, testaceus, concoloratus; pedes longissimi immaculati.

Long. 3 lin.

Phalangium Opilio, Linn. Syst. Nat. Turton's edit. vol. iii. p. 716.

Phalangium parietinum, Herm. Mem. Apt. p. 98.

Opilio parietinus, Herbst, Ung. Ins. Heft 2. p. 12 ♀; Koch, Die Arach. B. xvi. p. 12. tab. 545.

Opilio longipes, ibid. p. 22. tab. 2. fig. 2 ♂.

Female Body elongated oval. Abdomen slightly contracted immediately behind its junction with the cephalothorax. The latter small and narrow in front, where it is rather deeply notched, the notch however being divided by a central projection. Eye-eminentia small, longer than high (fig. 3 a), oval when seen sideways, narrow above, the crests on its summit being near together; these are each furnished with five or six small blunt teeth. Between the eye-eminentia and the anterior margin of the thorax are two elevated ridges, each armed with a row of three or four rather large teeth, enclosing a smooth narrow space between them. Several other sharp tubercles or teeth are scattered along the lateral parts of the thorax. *Colour* of the cephalothorax yellowish-gray, mottled with white. Abdomen ash- or fawn-coloured, without a distinct dorsal band, though the central part of the back is darker than the rest. Upper surface variegated with dark semilunar transverse marks and small whitish spots. Under surface of the body white, marked with brown or black. *Palpi* small, joints without projecting angles. *Falces* weak. *Legs* long, slender, and nearly smooth; femora of second pair longer and thinner than the rest; coxæ and trochanters spotted with black, the other joints annulated with brown and white rings.

Male. Body short and broad. Abdomen small and depressed. Cephalothorax largely developed, being nearly as long as the abdomen, rugose, and having the tubercles and teeth on its surface much larger and more numerous than in the female. Cephalothorax separated from the abdomen by two strongly marked rings or ridges. *Palpi* and *falces* stronger than in the female; *legs* very long, and armed with short black spines or bristles.

Body and limbs all of a yellowish-brown colour, the under surface of the body, palpi, falces, and bases of the legs being paler than the rest.

This species, which is found very commonly upon walls in the autumn, is the true *Phalangium opilio* of Linnæus. I have however adopted the specific name of *parietinum*, first given by DeGeer, in consequence of using the word *Opilio* in a generic sense, in imitation of Herbst, Koch, and Leach. *P. parietinum* does not appear to have been known at all to Latreille; he confounded the female of *P. cornutum* with it, and finding the males and females of the latter in union, jumped to the conclusion that the *P. cornutum* and *P. opilio* of Linnæus were only the male and female of the same species. Most authors have fallen into the same or into equally great errors, and until the publication of Koch's figures and descriptions in 1847, the greatest confusion existed respecting these two common species. As noticed by Mr. Tulk, they are mostly found in different localities; the *cornutum* living in rural or suburban situations, beneath stones, or among dry herbage, while the *parietinum* is seldom seen except upon the walls of buildings.

4. *Phalangium canescens*, Koch.

Fem. cana. Vitta angulata dorsalis cinerea, linea centrali pallida et punctis albidis instructa. Palpi 3^{tiis} articulis valde angulatis.

Long. 2 lin.

Opilio canescens, Koch, Die Arach. B. xvi. p. 28. pl. 549. f. 1522.

In general form and design this small species bears considerable resemblance to the female of *P. cornutum*; it differs from it however in not being above half the size, and in having the surface of the cephalothorax, as well as the falces and legs, nearly free from tubercles and spines. The sides of the cephalothorax are rather elevated. The eye-eminnence is nearly semicircular, of a moderate size, and furnished with a small but sharp crest.

The colour is whitish-gray, with a dark angular dorsal band, which is sprinkled with white spots, and intersected with a longitudinal central white streak. The *palpi* are moderately long, and the third joint has a strongly projecting internal angle; they are of a whitish colour, striped above with brown; they are also covered with thinly scattered black hairs, and have dark extremities. The *legs* are rather short, of a yellowish colour, slightly marked with brown, and have the extremities of the tarsi dark.

The *male* is unknown.

This species is generally distributed, but not very common.

5. *Phalangium minutum*, n. s.

Canum vel murinum, nigro variegatum, vitta dorsali lata et angulata signatum. Eminentia ocularia ampla, tuberculis obtusis cristata.

Long. $\frac{2}{3}$ lin.

Body rather short and wide; cephalothorax large, with a considerable-sized eye-eminence, crested with bluntish tubercles.

The colour is whitish or yellowish gray. The front and sides of the thorax are variegated with a few irregular-shaped black spots, and the back of the abdomen is traversed longitudinally with a whitish dorsal band having one triangular projection on each side. It is of a dark gray colour, mottled or variegated in a transverse direction with white. The palpi are furnished with a projecting process on the third joint, and together with the legs, which are rather short and stout, are of a yellow or brownish colour.

I have seen but two specimens of this very minute *Phalangium*, one of which was immature. I was doubtful about the sex in both of them, and their habitat was unknown to me.

Genus 2. *Megabunus**, mihi.

Eye-eminence very large, furnished with a projecting double crest and large eyes. Palpi branched, and spiny on the under surface. Legs of moderate length and slender. Body rather short, and cephalothorax large in both sexes.

1. *Megabunus corniger*, Herm. Pl. X. fig. 4.

Testaceus vel luteus, vitta dorsali, et lateribus abdominis ferrugineis.

Mas, falcium articulo secundo, ante apicem chelas prope, in cornu superne elevato.

Long. fœm. 3, maris 2 lin.

Phalangium cornigerum, Herm. Mem. Apt. p. 102. pl. 8. f. 2; Walck. Hist. Nat. des Ins. Apt. t. iii. p. 119.

Opilio corniger, Koch, Die Arach. B. iii. p. 87. pl. 102.

Cephalothorax nearly as wide as the abdomen. *Eye-eminence* large and broad (fig. 4 *a*); the crests separated by a deepish groove, and each armed with seven or eight large but bluntish tubercles (*b*). Eyes large, and surrounded by black rings. Colour of the cephalothorax pale brownish-yellow, marked with irregular brown spots. *Abdomen* convex, oval, and rather pointed at the apex, similar in colour to the cephalothorax,

* From μέγας, great, and βουνός, eminence.

having a ferruginous dorsal band (often indistinct), which is wider in the centre than at the extremities, and separated by a pale line from the sides of the abdomen, which are of a dark colour. Under surface of the body pale. *Falces* rather long, and pale in colour except at the points of the forceps, which are black. *Palpi* rather long, the two first joints covered beneath with long teeth and bristles (fig. 4 *d*); the second joint is thickened at its extremity; the third is furnished at the end with a projecting branch on its inner side; the fourth has a similar but smaller projection. All the joints are covered with fine hairs, and are of a pale yellowish colour, except the extremity of the terminal joint, which, together with the hook at the end, is black. *Legs* of moderate length, slender, and of a yellowish colour; femora with short black spines.

Male very similar to the female in structure and colour, but the abdomen is shorter and the legs are longer. The *falces* are furnished with a short conical sharp horn (fig. *c*), which projects from the front and outer surface of the second joint, just above the forceps.

This distinct and pretty species occurs in woods in different parts of England, but does not appear to be very common.

2. *Megabunus insignis*, n. s. Pl. X. fig. 5.

Cinereus nigro variegatus, eminentia oculifera, pedibus et palpis testaceis. Cristæ oculariæ spinis longissimis instructæ. Margines thoracis, et femorum tibiærumque articularum apices, dentati.

Long. fœm. 2, maris 1 lin.

Body oblong and convex. *Cephalothorax* large and angular. *Abdomen* compressed at the sides and pointed behind. Each side of the cephalothorax is armed with two spines, and there is sometimes a small one projecting from the centre of the anterior margin. Eye-eminence very large (fig. 5 *a* & *b*), and slightly contracted at the root into a thick pedicle. Eyes very large and surrounded by a black circle. The crests (separated by a wide interval) are each formed by five large tubercles, which are armed with long dark spines. The ground colour of both the cephalothorax and abdomen is pale blue-gray, and they are each spotted and marbled with black. The sides of the abdomen are marked with large black patches, and there is a broad longitudinal dorsal band of an angular or rhomboidal shape, the margins of which are black and the centre dark gray. The *palpi* are stout, the second joint is long and curved, and has a small projecting process furnished with a tuft of hairs at its distal extremity on the inner side. The under surfaces of both the

first and second joints are armed with long teeth. The third and fourth joints are branched; the under surface of the latter is also provided with two or three teeth, and the ends of both the branches and the terminal joints of the palpi are covered with dark hair. The *legs* (which together with the palpi and eye-eminnence are testaceous in colour) are annulated with pale rings. The apices of the femora and first joints of the tibiæ are each armed with one or two sharp and long spines (fig. *c*). The coxæ of the first pair of legs are armed on the under surface with numerous teeth.

The *male* is similar in form and colour to the female, but is much smaller; it has the eye-eminnence proportionably larger and the spines on the legs longer.

This very remarkable-looking animal, which, with its large spiny head and great eyes, presents a very grotesque and even (through the microscope) formidable appearance, is not figured or described in any work that I have seen, which leads me to the belief that it is perhaps peculiar to Great Britain. It is generally distributed, but not common in this country. I have twice found it in the neighbourhood of Bradford; I have also received specimens from Mr. Blackwall, collected in North Wales, and have likewise obtained it from other parts of England, and from Ireland.

Genus 3. *Opilio*, Herbst.

Legs of moderate length, the second pair, which is always the longest, not generally being more than four times the length of the body, and in the females often less; the first joints of the tarsi (*heels*) undivided. Body somewhat depressed: cephalothorax with three projecting teeth on its upper and front surface, and with the lateral margins often crenulated or toothed. Eye-eminnence small, and with a toothed crest. Palpi of moderate length, the third and fourth joints often with projecting processes or angles; the first and second joints are always armed with numerous large and strong spines on the under surface; coxæ and trochanters also spiny; dorsal band when present generally oblong and square at the extremity. Edges of the abdominal rings often fringed with sharp tubercles or spines.

1. *Opilio histrix*, Latr. Pl. XI. fig. 6.

Corpore cinerascente, vel testaceo, quadrato-ovali et depresso; thoracis lateribus valde crenatis, et spinis tribus robustis, approximatis et porrectis, marginis antici medio positis; tuberculo oculifero granulis obsolete coronato; abdomine vitta dorsali nigricante, quadrata; pedibus crassis et brevibus.

Long. fœm. 4 ad 5, maris 3 lin.

Phalangium hirtix, Latr. Hist. Nat. des Fourm. p. 376; Gen. t. i. p. 140; Walck. Hist. Nat. des Ins. Apt. t. iii. p. 121.
Opilio hirtix, Leach, Samouelle's Ent. Comp. p. 120.

Cephalothorax nearly semicircular, and considerably narrower than the abdomen, which is depressed; the front is elevated and bears a cluster of tubercles, the three foremost of which are prolonged forwards in the form of large thick teeth (fig. 6 c). The circumference of the cephalothorax is armed with teeth, which are arranged on crenulations or semicircular projections, three or four in number on each side. Eye-eminence small and crested, with blunted tubercles (fig. 6 a). Abdomen with the posterior edge of each ring furnished with a row of minute teeth. Legs short and stout, first joints of the tibiæ armed with short spines at their extremity (fig. 6 b).

The colour is dirty yellow, spotted and mottled with brown; there is an oblong dorsal band on the abdomen with nearly straight sides and square extremity, of a brown colour, the margins of which are darker than the centre. The abdominal segments are marked by transverse rows of round yellow spots, each having a dark point in the centre. The legs are pale yellow annulated with brown. The male is shorter and proportionably wider than the female, but otherwise similar.

I have included this fine *Phalangium* in the list of British species upon the authority of Samouelle, who says, in his 'Entomologist's Useful Compendium,' that it is found in England, but I have never seen a native specimen. It is very common in the neighbourhood of Paris, from whence I have received many individuals. In the illustrated edition of the 'Règne Animal,' published by the pupils of Cuvier in 1840 (the division on the Arachnida in which was edited by Dugès and Milne-Edwards), there is an imperfect representation of this species, marked fig. 1 a in plate 23, where it is designated as the female of *P. cornutum*, and named *P. opilio*. This gross inaccuracy proves that there is as much ignorance respecting the species of this family in France as in England.

2. *Opilio ephippiatus*, Koch.

Corpore ferrugineo vel murino, albo punctato; vitta dorsali nigra vel ferruginea, maribus valde notata; lateribus abdominis argenteis: thorace tribus dentibus gracilibus et fere erectis, margine antico, medio positis: pedibus gracilibus. Long. fœm. 3, maris 2 lin.

Acantholophus ephippiatus, Koch, Die Arach. B. xv. p. 121. t. 539.

Body somewhat short and convex; abdomen rather wider than

the cephalothorax and pointed behind; anterior margin of the cephalothorax almost straight, and having an eminence in the centre of its upper surface upon which are seated five or six sharp teeth; three of these, which are nearly equal in size and longer than the others, are placed close together in a parallel row in front and project nearly perpendicularly upwards; behind these are seated two or three others. On each lateral angle of the front margin is placed another tooth, forming the inner boundary of the spiracle, which is also bounded externally by one or two more teeth. Between the attachments of the second and third pair of legs is a small semicircular projection or crenulation of the lateral edge of the cephalothorax, on which are seated three short spines or rather pointed tubercles. Another similar but smaller toothed projection is seated behind this, between the insertions of the third and fourth pairs of legs. The eye-eminence is small, and narrow at its upper part; the crests, which are each furnished with four or five sharp tubercles, being approximated together, so as to leave a very narrow groove between them; by this means the eyes, which are large, and surrounded with a black ring, are made to look somewhat upwards. The falces and palpi are rather small and weak. The legs are slender.

The colour is reddish brown or gray, darker in mature specimens, and often variegated with white and black spots and silvery reflections. The dorsal band extends through the cephalothorax (the posterior part of which it covers) to the commencement of the posterior third of the abdomen; the thoracic portion is triangular and broad, and at the base of the abdomen it contracts into a straight longitudinal band with nearly parallel sides and square extremity. The colour of the band is reddish brown or black; the margins are darker than the centre, and it is surrounded by a pale streak. The sides of the abdomen are mottled with white, and have a metallic silvery lustre. The legs are annulated with brown, and a wide piceous band surrounds the extremity of the second joint of the tibiæ.

The male closely resembles the female, but is smaller and darker in colour, and is more distinctly marked, having the dorsal band darker and narrower. The legs are longer.

This species bears considerable affinity to the former one (*O. histrix*), but is much smaller, has the legs longer and more slender, and the teeth on the anterior part of the cephalothorax placed in a more upright position. It is found abundantly in various parts of England and Wales, at the roots of grass, in meadows and pastures, at the latter end of summer. This is included with several other Phalangiidæ in Koch's genus *Acantholophus*, the characters of which are much the same as those I have assigned to the genus *Opilio*; I have adopted the latter

name however in consequence of its having been applied by Dr. Leach to the species *histræa*, which may be considered as the typical one; and also because the title *Acantholophus** is not characteristic of the genus, the ocular crest being only furnished in most species with short spines, and not by any means conspicuous.

3. *Opilio agrestis*, n. s.

Corpore murino, fusco et albo variegato; vitta dorsali indistincta: dentibus frontalibus brevibus et crassis: eminentia oculifera fere lævi: pedibus fusco annulatis.
Long. 2 lin.

This species closely resembles *Opilio ephippiatus* in general form; it is however rather smaller, and has three much shorter and thicker teeth on the front of the cephalothorax, the middle one of which is longer than the others. The lateral margins are free from crenulations, but each has two short stout teeth, one placed between the first and second, and the other between the second and third pairs of legs. The eye-eminentia is almost devoid of tubercles or teeth on the crest.

The colour of this species is darker than that of *O. ephippiatus*; the dorsal band is distinctly marked on the cephalothorax, but becomes indistinct upon the abdomen, which is marked by transverse rows of dark brown stripes intermingled with white spots. The legs are short and feeble, and annulated with blackish-brown marks.

The male is similar to the female, but has the body smaller and darker, and the legs longer.

This is a very common species, and is met with in the same localities as the preceding.

4. *Opilio terricola*, Koch.

Corpore luteo, rubro alboque punctato; vitta dorsali tenuiter notata; eminentia oculifera dentibus longis cristata; palporum articulis tertiis quartisque digitatis.
Long. $1\frac{1}{2}$ lin.

Opilio terricola, Koch, Die Arach. B. iii. p. 48. t. 90. f. 204.

Body rather short; cephalothorax equal in width with the abdomen, the back of which is a little elevated; front margin of cephalothorax straight and rather wide; three long and slender teeth project forwards and a little upwards from its centre, the middle tooth being considerably longer than the others; the external angles, where the spiracles are seated, are also furnished

* From *ἀκανθα*, a thorn, and *λόφος*, a crest.

with short spines. The ocular crests are each armed with four long blunt teeth, the two middle or upper of which are longer than the others, and the second from the front the longest of all. The palpi are of moderate length; the second joint is spinous on its under surface, and the third and fourth are furnished with projecting hairy processes at their extremities; the fourth has also two or three teeth on its under surface. The legs are short, particularly the first and third pairs, which are much abbreviated, particularly the former; the second pair is much longer than the others.

The predominating colour of this species is dull pale yellow, which is mottled or variegated with white and reddish brown. The spiracles on the external angles of the cephalothorax are surrounded by a dark or black spot; there is no distinct dorsal band, but two rows of reddish-brown spots extend across the thorax and abdomen, enclosing a longitudinal space between them, which is wide and triangular on the thorax, becomes contracted at the base of the abdomen, and then dilates posteriorly into an oval form. The legs and palpi are faintly annulated with pale reddish-brown marks.

The sexes of this pretty and well-marked little species are not known; the only specimen that I have seen, and which appeared to be a male, was transmitted to me by Mr. Blackwall, and captured by that eminent arachnologist in North Wales.

Genus 4. *Leiobunus*, Koch.

Legs particularly long and slender. Body rather short and round, especially in the males; cephalothorax without tubercles or spines; eye-eminence small and quite smooth, being destitute of crest; palpi rather short and slender, and without projecting processes or angles.

1. *Leiobunus rotundus*, Latr. Pl. XI. fig. 7.

Fœm. corpore pallido-testaceo; in dorso abdominis macula fusca quadrata, pallide punctata; cephalothorace fronte et lateribus fusco; corneis, nigrocinctis; pedibus tenuibus et longissimis, fuscis.

Long. $2\frac{1}{2}$ ad 3 lin.

Mas, corpore brevi et orbiculato-ovali, ferrugineo vel testaceo, unicolorato.

Long. $1\frac{1}{2}$ ad 2 lin.

Phalangium rotundum, Latr. Hist. Nat. des Fourm. p. 379; Genera, t. i. p. 139; Walck. Ins. Apt. t. iii. p. 119.

Phalangium rufum, Herm. Mem. Apt. p. 109. pl. 8. f. 1.

Phalangium longipes, Hahn, Die Arach. B. ii. p. 70. pl. 71. f. 162.

Opilio fasciatus, Herbst, Ung. Ins. part 2. p. 23. pl. 4. f. 1, 2 ♀.

Opilio hemisphæricus, *ibid.* part 3. p. 11. pl. 9. f. 2 ♂.

Leiobunum rotundum, Koch, Uebers. des Arachnidensystems, ii. p. 36.

Leiobunum hemisphæricum, Koch, Die Arach. xvi. p. 51. pl. 556, 557.

The body of the *female* is convex and of an oblong oval shape. The margins of the cephalothorax are angular, but as well as the surface devoid of tubercles or spines; beneath the front margin over the base of the falces are two blunt projecting processes. The eye-eminence is small and smooth (fig. 7 *b*). The colour is testaceous, very pale in young specimens, and becoming darker with age; the front and sides of the cephalothorax, the apex of the abdomen, and an oblong quadrate spot on the dorsum of the latter are dark brown; the dorsal spot or band is spotted with yellow. A brown or black circle surrounds the eyes. The legs are dark brown in mature specimens, with the ends of the femora and tibiæ mostly white; when young the legs are pale. The palpi are tinged with brown on the upper surface.

The *male* differs from the female in being much smaller; in having the body short and round (fig. 7 *a*) (whence the name of the species); in being darker in colour (ferruginous when adult); in being devoid of dorsal band, and other dark marks on cephalothorax or abdomen. The legs are also much longer and darker in colour; the second pair of legs is twelve and a half times the length of the body.

This species is very abundant in woody places, where it may almost always be seen in the summer, running rapidly over the leaves and long grass: it is very frequently infested with the parasitical red mite.

Genus 5. *Nemastoma*, Koch.

Body short and ovate; cephalothorax and abdomen without any distinct line of separation; eyes seated either upon an irregular eminence near the anterior border of the cephalothorax, or upon elevated scale-like projections. Body distinctly annulated; rings separated by an interval at the apex of the abdomen. Palpi long and filiform. Falces horned in the males.

1. *Nemastoma bimaculatum*, Fabr.

Atrum, maculis duabus oblongis, albidis, ad basin abdominis. Long. 1 lin.

Phalangium bimaculatum, Latr. Hist. Nat. des Fourm. p. 376; Herm. Mem.

Apt. p. 105. pl. 8. f. 4; Walek. Ins. Apt. t. iii. p. 119.

Opilio bimaculatus, Herbst, ii. p. 25. tab. 3. f. 3, 4.

Nemastoma bimaculatum, Koch, Die Arach. B. iii. p. 71. tab. 96. f. 223.

Body convex and ovate, narrower in front than behind; the

upper surface of the cephalothorax and base of the abdomen are covered with a hard granulated membrane, which on the latter is elevated into distinct projecting rings or segments. Eyes seated on a broad and slightly elevated eminence, placed close to the anterior margin of the cephalothorax; the eminence is rough and irregularly tuberculated on the summit, but has no distinct crest; there is a deep notch in the centre of the front border of the cephalothorax. The palpi are nearly as long as the body and filiform; the first joint is short, the second is the longest, the others gradually diminish in length. The legs are short and rather thick; the first pair is not more than twice the length of the body, and the second (the longest) not more than three times. The coxæ are tuberculated on their under surface.

The whole body is black or brown, with the exception of two white or sometimes yellow spots, of an oblong form, which are seated on each side of the upper surface of the body, a short distance behind the eye-eminence. The palpi and legs are also black or brown; the bases of the femora are encircled by two narrow pale rings.

The males are similar in form and colour to the females, but are smaller, and have a thick blunt horn or process projecting from the end of the first joint of the falces forwards over the second joint. This is a very common species in England, and may frequently be found under stones.

2. *Nemastoma chrysomelas*, Herm. Pl. XI. fig. 8.

Luteum; medio thoracis, dorsoque abdominis brunneis; hoc duobus ordinibus punctarum argentearum, illo lateribus argenteis; oculis super squamas positis; palpis longissimis et pubescentibus; femoribus quasi mediis articulatis.

Mas, falcibus bicorniculatis.

Long. fem. 1, maris $\frac{2}{3}$ lin.

Phalangium chrysomelas, Herm. p. 108. pl. 8. fig. 3.

Nemastoma chrysomelas, Koch, Uebersicht, Heft 2. p. 38.

Body ovate; the front of the cephalothorax truncate; eyes seated at the inner extremities of two large triangular scale-like processes (fig. 8 *b*), which extend from the sides towards the front and centre of the cephalothorax, where they become elevated, and have their apices serrated or dentated, thus forming a double crest above the eyes; the anterior and posterior margins of the scales are also serrated. The back of the abdomen is covered with transverse scaly rings, the edges of which are notched and projecting; towards the apex the rings are separated by considerable intervals.

The palpi are slender, and about one and a half times the

length of the body; the second and third joints are longer than the others, and nearly equal to each other in length.

The legs are rather longer than in the preceding species, and slender; the apices of the two tibial joints are thickened.

The colour is dull white or yellow; the apices of the thoracic scales are dark brown or black; the dorsum of the abdomen is brown; the spaces between the posterior rings are pale. Two rows of silvery, and sometimes golden spots, are arranged longitudinally on each side of the dorsum, the spots being seated on the rings; they become more distinct towards the apex; the sides of the cephalothorax are also adorned during life with silvery or golden reflections. The falces, palpi and legs are brown; the basal joints of the palpi and the extremities of the femora and tibiæ are pale; the middle of the femoral joints is annulated with several pale rings, giving them the appearance of being divided into numerous articulations.

The males have both joints of the falces armed with short, thick, horny processes (fig. 8 *e*); but resemble the females in shape and colour, with the exception of being about a third smaller, and rather darker.

This very elegant little species is not common; but I have found several specimens in the neighbourhood of Bradford, beneath stones, in the autumn, in woody places. Hermann, the only author by whom it has been described (Koch only alluding to his account of it), says that it is found in forests, among moss.

Genus 6. *Homalenotus*, Koch.

Body depressed and flat on the upper surface. Cephalothorax narrow and pointed in front, without stigmata on the margins, and distinctly separated from the abdomen. Eye-emergence small and tuberculated, but without a regular crest. Abdominal segments distinct on the under surface, but soldered into a uniform plate or buckler on the dorsum, which is furnished with several rows of large blunt tubercles. Legs short and spiny, the second pair slender, the others thickened; the first joints of the tarsi undivided.

Homalenotus quadridentatus, Fabr. Pl. XI. fig. 9.

Ochraceus; abdomine tuberculorum pallidorum serie quadruplici ornato (ordinibus duobus centralibus, super maculas fuscas positis); apice quadridentato. Cephalothorace frontis medio cornu porrecto.

Long. 3 lin.

Phalangium spinosum, Latr. Hist. des Fourm. p. 375.

Phalangium quadridentatum, Latr. Gen. tom. i. p. 140; Walek. Ins. Apt. tom. iii. p. 120.

Homalenotus monoceros? Koch, Die Arach. B. xv. p. 188. pl. 534. f. 1493.

Cephalothorax narrow; the front part is somewhat semi-circular, and the front margin projects into a central point, which is elevated and prolonged into a horn-like process, about half the length of the thorax, and projecting upwards and forwards. This horn is double at the base, the lower portion forming a kind of spur, about half the length of the upper one, and placed vertically beneath it, so as not to be visible when the animal is examined from above. The sides of the thorax are straight, and the posterior angles project backwards. The eye-eminence is small, rather higher in front than behind, and surmounted by several blunt tubercles. The whole upper surface of the thorax, as well as the abdomen, is scabrous, but destitute of spines or bristles: behind the eye-eminence, and close to the posterior margin of the thorax, are two blunt tubercles.

The abdomen is wide and flat; the apex is wide and rather elevated, and furnished with four large, blunt, but short teeth, which project beyond the margin, and are placed rather wide apart from each other, at equal distances. Four longitudinal rows of tubercles extend down the back, the two central rows being nearer to each other than to the lateral ones, which approach the sides. Each row contains four tubercles, which are much larger in the middle than in the lateral rows; in the latter they are small, and sometimes indistinct.

The falces are small and weak. The palpi are short, with the third and fourth joints rather thickened. The first and third pairs of legs are very short, the length of the femora not being more than twice as much as the width. The second pair is rather longer than the fourth, and more slender than any of the rest. The coxæ, trochanters and femora are all furnished with long blunt teeth; those on the coxæ projecting round the margin of the thorax, and looking as if attached to it.

The colour of this species is brownish yellow, mottled and striped with dark brown; a double brown line encircles the thorax, intersected with cross bars; there is a dark mark on each side of the eye-eminence, and the tubercles on the posterior margin of the thorax are seated on dark spots, as are also those on the abdomen. All the tubercles are pale yellow. Four dark stripes extend from the tubercles at the apex of the abdomen towards the dorsum. The legs are annulated with brown in adult specimens.

This peculiar *Phalangium*, which differs considerably in its structure from any other known species, bears considerable resemblance to the animals composing the genus *Trogulus*. The only locality in which I have found it was on the chalk hills near Hampden, in Buckinghamshire, where it was tolerably abundant among moss in August 1854. It is probably not uncommon in the south of England.

EXPLANATION OF PLATES X. AND XI.

PLATE X.

- Fig. 1. *Phalangium cornutum*, body of the female: *a*, side view of the cephalothorax; *b*, part of the cephalothorax and one of the falces of the male.
- Fig. 2. *Phalangium urnigerum*, body of the female: *a*, side view of the cephalothorax; *b*, side view of the body with the falces and palpi; *c*, body of the male; *d*, one of the falces.
- Fig. 3. *Phalangium parietinum*, body of the female: *a*, side view of the cephalothorax.
- Fig. 4. *Megabunus corniger*, body of the male: *a*, eye-eminnence seen from above; *b*, side view of the same; *c*, one of the falces of the male; *d*, palpi of male and female.
- Fig. 5. *Megabunus insignis*, body of the female: *a*, side view of the eye-eminnence; *b*, the same seen from above; *c*, one of the legs; *d*, side view of the body.

PLATE XI.

- Fig. 6. *Opilio histrix*, body of the female: *a*, side view of the eye-eminnence; *b*, one of the legs; *c*, frontal teeth.
- Fig. 7. *Leiobunus rotundus*, body of the female: *a*, body of the male, with one of the palpi attached; *b*, side view of the eye-eminnence; *c*, one of the legs; *d*, one of the palpi.
- Fig. 8. *Nemastoma chrysomelas*, body of the female: *a*, side view of the body in the male, showing one of the palpi and falces; *b*, eye-eminnence or scale; *c*, apex of the abdomen; *d*, one of the falces in the female; *e*, the same in the male.
- Fig. 9. *Homalenotus quadridentatus*, the body with legs and palpus attached on one side.

XXXVI.—On the Structure of Chlorophyll.

By HUGO VON MOHL.

[Concluded from p. 329.]

WITH the pellicular form of the chlorophyll, such as occurs in *Zygnema* (and in still more intimately connected layers in *Draparnaldia*, *Ulothrix*, &c.), as a more or less perfect investment of the cell-wall, is connected in many respects the chlorophyll of *Anthoceros*, for this, in like manner, does not possess the form of isolated grains, but presents itself in every cell as a single chlorophyll-mass, which in a portion of the cells has a membranous form. But the chlorophyll of *Anthoceros* is distinguished from that of *Zygnema*, by the fact that in the latter genus it stands in no direct connexion with the central nucleus, and forms a peripheral layer, while in *Anthoceros* the green colouring matter is connected with one of the masses of protoplasm enveloping the nucleus, and, at least in a portion of the cells, occupies a central position.